

AD-A253 811



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Form Approved  
OMB No 0704-0188

estimated to average 1 hour per response, including the time for reviewing instructions, furnishing the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE 07/92		3. REPORT TYPE AND DATES COVERED POP Test (06/92)	
4. TITLE AND SUBTITLE Performance Oriented Packaging Testing of Container, Shipping and Storage, Mk 3 Mods 0, 1, 2, and 3 for Packing Group II Solid Hazardous Materials				5. FUNDING NUMBERS <b>DTIC ELECTE</b> <b>S AUG 3 1992 D</b> <b>A</b>	
6. AUTHOR(S) Victor D. Saul					
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Weapons Station Earle Test and Evaluation Branch (Code 5023) Colts Neck, NJ 07722-5000				8. PERFORMING ORGANIZATION REPORT NUMBER DODPOPHM/USA/DOD/NADTR92018	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Commander, Naval Sea Systems Command (PMS-422) Department of the Navy Washington, DC 20362-5101				10. SPONSORING/MONITORING AGENCY REPORT NUMBER Same as above	
11. SUPPLEMENTARY NOTES N/A					
12a. DISTRIBUTION/AVAILABILITY STATEMENT <b>This document has been approved for public release and sale; its distribution is unlimited.</b>		12b. DISTRIBUTION CODE			
13. ABSTRACT (Maximum 200 words)  This Performance Oriented Packaging (POP) test was conducted to ascertain whether the Mk 3 Mod 3 Shipping and Storage Container meets the Packing Group II requirements specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9 and the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 1 October 1991. The packaged commodity used for the test was a simulated load of 20 mm inert linked ammunition weighing 48 kg (105 pounds). This represents the current maximum commodity weight. To compensate for future growth variations in product and/or packaging, 3 kg (7 pounds) were added. Gross weight of the loaded container was 59 kg (130 pounds). The test results indicate that the container has conformed to the POP requirements.  In addition, due to their similarities in design, size, and weight, this test is considered representative of qualification testing for the Mk 3 Mods 0, 1, and 2 Shipping and Storage Containers as per the variation in Title 49 CFR 107, Sec. 178.601h.					
14. SUBJECT TERMS  POP Test of Mk 3 Mods 0, 1, 2, and 3 Shipping and Storage Container				15. NUMBER OF PAGES 8	
				16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT  UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE  UL	19. SECURITY CLASSIFICATION OF ABSTRACT  UL	20. LIMITATION OF ABSTRACT  UL		

**DODPOPHM/USA/DOD/NADTR92018**

Superseding  
DODPOPHM/USA/DOD/NADTR91017  
6 August 1991

**PERFORMANCE ORIENTED PACKAGING TESTING  
OF  
CONTAINER, SHIPPING AND STORAGE, MK 3 MODS 0, 1, 2, AND 3  
FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS**

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July 1992

**FINAL**

**92-20929**



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## INTRODUCTION

This Performance Oriented Packaging (POP) test was performed to ascertain whether the Mk 3 Mod 3 Shipping and Storage Container (Packing Group II) meets the requirements specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9 and the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 1 October 1991. The packaged commodity used for the test was a simulated load of 20 mm inert linked ammunition weighing 48 kg (105 pounds). This represents the current maximum commodity weight. To compensate for future growth variations in product and/or packaging, 3 kg (7 pounds) were added. Gross weight of the loaded container was 59 kg (130 pounds).

Due to unavailability only one container was used for testing. This is less than the number required by the regulations. Approval for this deviation has been granted by the Under Secretary of Defense, Memorandum for the Joint Logistics Commanders dated 22 February 1990.

In addition, due to their similarities in design, size, and weight, this test is considered representative of qualification testing for the Mk 3 Mods 0, 1, and 2 Shipping and Storage Containers as per the variation in Title 49 CFR 107, Sec. 178.601h.

## TESTS PERFORMED

### 1. Base Level Vibration Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.608. The container was placed on a repetitive shock platform which has a vertical linear motion of 1-inch double amplitude. Movement of the container was restricted during vibration in all but the vertical direction. The frequency of the platform was increased until the container left the platform 1/16 of an inch at some instant during each cycle. Test time was 1 hour.

### 2. Stacking Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.606. The container was subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a minimum height of 3 meters (including the test container). A weight of 531 kg (1,170 pounds) was stacked on the test container. The test was performed for 24 hours. The weight was then removed and the container examined.

### 3. Drop Test

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.603. Five drops were performed from a height of 1.2 meters (4 feet), impacting the following surfaces:

- a. Flat bottom.
- b. Flat top.
- c. Flat on long side.
- d. Flat on short side.
- e. One corner.

## **PASS/FAIL**

### **1. Base Level Vibration Test**

The criteria for passing the base level vibration test is outlined in Title 49 CFR, Sec. 178.608(c): No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

### **2. Stacking Test**

The criteria for passing the stacking test is outlined in Title 49 CFR, Sec. 178.606(d): No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength, cause instability in stacks of packages, or cause damage to inner packagings likely to reduce safety in transportation.

### **3. Drop Test**

The criteria for passing the drop test is outlined in Title 49 CFR, Sec. 178.603(f): A package is considered to successfully pass the drop tests if for each sample tested, no rupture occurs which would permit spillage of loose explosive substances or articles from the outer packaging.

## **TEST RESULTS**

### **1. Base Level Vibration Test**

Satisfactory.

### **2. Stacking Test**

Satisfactory.

### **3. Drop Test**

Satisfactory.

## **DISCUSSION**

### **1. Base Level Vibration Test**

The input vibration frequency was 3.8 Hz. Immediately after the vibration test was completed, the container was removed from the platform, turned on its side and inspected. No unfavorable distortion or deterioration was observed.

### **2. Stacking Test**

The container was inspected after the 24-hour period was over. No unfavorable distortion or deterioration was observed.

### **3. Drop Test**

After each drop, the container was inspected. The contents were completely retained by the container.

## **REFERENCE MATERIAL**

A. United Nation's "Recommendation on the Transportation of Dangerous Goods," ST/SG/AC.10/1, Revision 6.

B. Code of Federal Regulations, Title 49 CFR, Parts 107-178.

C. Bureau of Explosives Tariff No. BOE 6000K Hazardous Materials Regulations of the Department of Transportation by Air, Rail, Highway, Water including Specifications for Shipping Containers.

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## TEST DATA SHEET

<b>POP MARKING:</b>	
UN 4A1/Y59/S/**/USA/DOD/NAD	
**YEAR LAST PACKED OR MANUFACTURED	
<b>DATA SHEET:</b>	
Container: Mk 3 Mods 0, 1, 2, and 3 Shipping and Storage Container	
Type: 4A1	Container P/N or NSN: NSN 1305-01-003-2461
Specification Number: MIL-B-18876	Material: Steel
Gross Weight: 59 kg (130 pounds)	Dimensions: 18-1/4" L x 9-5/16" W x 12-7/8" H
Closure (Method/Type): Over-Center Latches	Tare Weight: 8 kg (18 pounds)
Additional Description: Ammunition Box	
<b>PRODUCT:</b>	
Name: See table 1	NSN(s): See table 1
United Nations Number: See table 1	
United Nations Packing Group: II	
Physical State (Solid, Liquid, or Gas): Solid	
Vapor Pressure (Liquids Only): N/A      At 50 °C: N/A      At 55 °C: N/A	
Consistency/Viscosity: N/A	Density/Specific Gravity: N/A
Amount Per Container: See table 1	Flash Point: N/A
Net Weight: See table 1	
<b>TEST PRODUCT:</b>	
Name: 20 mm Inert Ammunition	Physical State: Solid
Consistency: N/A	Density/Specific Gravity: N/A
Test Pressure (Liquids Only): N/A	
Amount Per Container: N/A	Net Weight: 51 kg (112 pounds)
Additional Description:	
The net weight includes the current maximum product weight plus an additional 3 kg (7 pounds).	

**TABLE 1**  
**Products Approved for Shipping in the**  
**Mk 3 Mods 0, 1, 2, and 3 Shipping and Storage Container**

NALC/ DODIC	NSN	Product Nomenclature	Packing Drawing Number	Haz Class/Div	UN Number	Units/ Cntr	Total Net Weight (lb)	Total Gross Weight (lb)
DW33	1361-01-023-5175	Signal Underwater	2127915	1.1D	0034	6	42.3	57.3
SW04	1361-00-071-5077	Signal Underwater	2127915	1.1D	0034	6	83.9	98.9
SW06	TBD	TBD	2128042	TBD	TBD	6	41.0	56.0
SW18	1361-00-22-9967	TBD	2127927	1.1D	0034	6	32.0	47.0
SW20	1361-00-220-9965	TBD	2127927	1.1D	0034	6	32.0	47.0
SW21	1361-00-220-9964	TBD	2127927	1.1D	0034	6	32.0	47.0
SW23	1361-00-220-9962	TBD	2127927	1.1D	0034	6	32.0	47.0
SW24	1361-00-220-9961	TBD	2127927	1.1D	0034	6	32.0	47.0
B545	1310-00-678-9996	Ctg, 40 mm Blank Saluting	328874 329494 564203 564212	1.3C	0327	18	52.0	67.0
A862	1305-01-003-2461	Ctg, 20 mm Linked	328874 329494 564203 564212	1.2E	0321	128	82.0	97.0
A672	1305-00-139-5923	Ctg, 20 mm TP	328874 329494 564203 564212	1.4C	0339	130	105.0	120.0
A747	1305-00-055-1282	Ctg, 20 mm Linked	328874 329494 564203 564212	1.2E	0321	130	105.0	120.0
A855	1305-00-250-0200	Ctg, 20 mm Linked	328874 329494 564203 564212	1.2E	0009	130	105.0	120.0
B650	1310-01-240-5741	Ctg, 40 mm, Blank Saluting	328874 329494 564203 564212	1.3C	0327	18	52.0	67.0

TBD = To Be Determined

**TABLE 1 (Continued)**  
**Products Approved for Shipping in the**  
**Mk 3 Mods 0, 1, 2, and 3 Shipping and Storage Container**

NALC/ DODIC	NSN	Product Nomenclature	Packing Drawing Number	Haz Class/Div	UN Number	Units/ Cntr	Total Net Weight (lb)	Total Gross Weight (lb)
D685	1320-00-832-7981	Reducer, Flash Propellant Charge	328874		0027	6	69.0	84.0
B550	1310-00-866-9744	Ctg, 40 mm, Blank Saluting	328874 329494 564203 564212	1.3C	0327	18	50.0	67.0
SW08	1361-00-065-7733	Signal Underwater	2127915	1.1D	0034	6	43.7	58.7
SW09	1361-00-065-7734	Signal Underwater	2127915	1.2D	0409	6	43.7	58.7
SW19	1361-00-220-9966	Signal Underwater	2127927	1.1D	0034	6	32.0	47.0
SW22	1361-00-220-9963	Signal Underwater	2127927	1.1D	0034	6	32.0	47.0
SW30	1361-00-101-4909	Signal Underwater	2127915	1.1D	0034	6	43.7	58.7
SW33	1361-00-406-1989	Signal Underwater	2127915	1.1D	0034	6	43.7	58.7
SW37	1361-00-376-5612	Signal Underwater	2127915	1.1D	0034	6	43.7	58.7

TBD = To Be Determined